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# United States Department of Agriculture,

## BUREAU OF PLANT INDUSTRY,

Farmers' Cooperative Demonstration Work.

WASHINGTON, D. C.

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## ECONOMIZE! CUT DOWN THE EXPENSES OF THE FARM!

### HOME FERTILIZERS FOR THE FARM.

It is essential to their ultimate success that the farmers of the South be impressed with the importance of giving more attention to the saving of farm manures. The convenience of commercial fertilizers, the ease with which they can be obtained (they can always be bought on credit), and the fact that their use requires little forethought have led most of our farmers to forget or neglect the home supply. Another reason why home manures have been neglected is that owing to the lack of intelligent care of them the results following their use have not been satisfactory. If much good has been obtained from them, it is usually reached only by their use in such large quantities as it is difficult to secure upon the average farm.

We should not be understood as opposing the intelligent and economical use of commercial fertilizers. Commercial fertilizers have proved themselves of great value and are destined to play even a greater part in our farm economy; but it is only when used as supplements to the home product that this will be so. In the first place, they are costly; and, secondly, their exclusive use instead of effecting a permanent improvement of the soil actually hastens the depletion of that soil of its plant food. It is only when used with green manures and barnyard manures that the most permanent improvement can be accomplished.

The small value frequently realized from the use of barnyard manure arises from the fact that it is not properly saved and handled and the manure has lost the greater part of its plant food. Barnyard manure may be regarded as just so much vegetable matter. It differs, however, from the food from which it is derived in that, having been once digested, its fertilizing elements are more available for plants.

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Available plant food means plant food that is easily decomposed and soluble in water. If the manure is left exposed to the elements, the water from rains easily and rapidly leaches out the soluble plant food. On the other hand, if the manure is allowed to heat, a large amount of the nitrogen is driven off into the atmosphere; so in order to get the most valuable manure both of these sources of loss must be avoided. There are several ways of accomplishing this. Probably the best plan, where it is practicable, is to haul the manure direct upon the land and plow it in—shallow on clay soils, deeper on sandy loams. Again, especially with horse manure, etc., it is good to allow the manure to remain in the stable, using plenty of litter. The animals tramp the manure down, thus excluding air, and as it is kept dry it will keep with practically no loss. The litter used in bedding not only is itself of value as a fertilizer, but serves also to absorb all liquids and prevent their loss. If not practicable to pursue either of these methods, then a cheap shed can be provided and the manure stored in it until ready for use.

There is one precaution that must be observed when a shed is used, and especially if the droppings from horses predominate. Under these conditions the manure is apt to heat. This should be prevented by dampening it. For this reason it is a good plan to have a leaky shed—one that will not permit the entrance of enough water to leach through, but will leak enough to keep the manure moist. In case of protracted drought there should be artificial means of watering the compost. The question may arise with the farmer whether it is more economical to go to this trouble and expense with his manure or to depend upon commercial fertilizers. This question is soon answered in the affirmative.

Bear in mind that while the farmer may buy an equal number of pounds of plant food he can not get it in as good a form, nor do the commercial fertilizers have as great an effect. They do not add vegetable matter, do not start soil fermentation, and do not correct mechanical defects of the soil. A ton of well-preserved manure from a well-fed horse contains about 9.8 pounds of nitrogen, 5.2 pounds of phosphoric acid, and 9.6 pounds of potash—plant food that would cost $2.18 bought as commercial fertilizer. This is on a basis of 15 cents a pound for nitrogen, 4½ cents for phosphoric acid, and 5 cents for potash.[a]

A horse weighing 1,000 pounds will produce about 12 tons of manure in a year, and this manure is consequently worth 7⅗ cents

[a] The values of fertilizers and manure here given are based on the prices of cotton-seed meal at $25 a ton, acid phosphate (15 per cent purity) at $15, and kainit at $12. Of course when these articles cost more, nitrogen, phosphoric acid, and potash should be rated higher and stable manure would be worth more.

 

a day, or about $27 a year. The manure from the average cow is worth about 6½ cents a day, or $23.20 per year. These values are based on the presumption that the animals are well fed. Where the common manure heap is used for all animals and for all farm refuse, while its composition is necessarily variable, it can safely be assumed that a ton of it will contain 12 pounds of nitrogen, 5 pounds of phosphoric acid, and 6 pounds of potash. The plant fertilizers in a ton of manure are worth commercially from $2 to $2.25. These values do not take into consideration the indirect benefits to the soil. While the actual plant food contained in a ton of barnyard manure is worth at least $2, it is safe to say that the farmer will derive nearer $3 worth of good from it.

When left in loose heaps under cover, it has been found that manure loses 1.4 per cent of its nitrogen. When these heaps are not covered this loss amounts to 30 per cent, and when exposed in thin layers, as is the case when it is left on the barn lot, this loss increases to 64 per cent. Putting it differently, the same manure that when properly cared for is worth $2.18 a ton, if allowed to remain in loose heaps for twelve months is worth only $2. When those heaps are uncovered the value falls to $1.70, and the unprotected thin layer at the end of that time is worth only $1.10. This is not the extent of the loss, for that portion of the fertilizer ingredients that is left is the least valuable, and what we have is really only the refuse of the formerly valuable manure. This tremendous loss from improper handling easily explains why our farmers find it necessary to use such large quantities of manure to derive much benefit from it. It will be observed that even when the manure is stored in a shed there is a loss. By covering the manure heap with certain substances it is found that not only can this loss be prevented, but that the stock of manure can be very greatly increased. A ton of ordinary loam will absorb 13 pounds of nitrogen, and if placed over the manure heap will prevent all loss of that substance. Sawdust will absorb 8 pounds per ton. Wheat straw will absorb nearly 4 pounds of the nitrogen. The necessity for absorbents brings us to the consideration of the compost heap.

## THE COMPOST HEAP.

By the compost heap the farmer is able to multiply his available manure many-fold. We should remember that anything of vegetable or animal origin is a valuable fertilizer if put in proper condition. The compost heap is the means of doing this. One ton of leaves contains 16 pounds of nitrogen, 6 pounds of phosphoric acid, and 6 pounds of potash, and at ordinary values for these substances is worth nearly $3. A ton of straw similarly is worth $2.25, and sawdust $2.20. These values, of course, are based on their total composition. In

actual practice it is safe to assume that half of their values are available. But it is only after undergoing fermentation in the compost heap that these values are available.

That it will pay the farmer to give more attention to the compost heap has been repeatedly proved by practical trials. At the North Louisiana Experiment Station, Calhoun, La., the following results were obtained: The land normally would produce one-fourth of a bale of cotton and 7 to 10 bushels of corn to the acre. By the annual application of 30 bushels per acre of a compost composed of stable manure, cotton seed, acid phosphate, and loam this yield has been increased to from 1¼ to 1½ bales of cotton and 50 to 60 bushels of corn. The annual expense of applying this compost amounted to a little over $1 per acre.

### HOW THE COMPOST HEAP IS MADE.

Locate the compost heap in an old shed or build a shed with any kind of old material for a roof. If the shed leaks some, all the better. Spread on the ground in a layer 10 inches thick 10 bushels of stable manure, wetting thoroughly. Over this scatter 100 pounds of acid phosphate or 100 pounds of high-grade ground phosphate rock. Then follow with another layer of manure and phosphate, etc. Continue these alternate layers until all the manure is used up or until the pile has become inconveniently high; then cover the pile, both top and sides, with 4 inches of forest mold or good loam taken from the fence corners. If stable manure or mold is not available, use straw, leaves, or any waste material, even weeds. Be sure and wet all thoroughly. After the heap has stood from four to six weeks it should be worked over and well mixed. This is best done by beginning at one end and cutting it down vertically, throwing the manure in a pile behind. Wet again and cover again with loam. It will be ready for use in three or four weeks.

The above proportions are for use with cotton. When the compost is desired for corn the quantity of phosphate can be reduced—use only 50 pounds instead of 100 to each layer. Thirty bushels, or one two-horse wagonload, per acre of this compost will produce very marked results. When this quantity is used, it is best applied in the drill just prior to planting. If preferred, the rows can be marked off and the compost distributed in this furrow and then bedded on. Be careful, however, not to bury it too deep, especially on clay soils. It is safe to estimate that this quantity of such a compost will more than double the crop on poor land the first year. Thus the composted land can be rotated, and in the course of a very few years all the land will be permanently improved.

Bearing in mind the supplemental value of the cowpea, it is safe to say that at least 50 per cent can be added to the productiveness of

the average 100-acre farm, and that simply at the cost of a few tons of acid phosphate and a little labor. With the compost and with the cowpea at his service to save and gather nitrogen for him, the average farmer is simply throwing his money away when he buys that substance in commercial fertilizer, for he could produce all his land needs upon his farm. Economy should be his watchword, and there is no better place for him to start than by stopping the waste of nitrogen that is so flagrant throughout the whole South. The soil is the farmer's bank, and the fertility stored therein by nature is his capital. He can no more expect to draw indefinitely upon this supply without ultimately exhausting it than he could expect his check to be honored without making fresh deposits.

The people of the South have been doing this for years, and their credit in nature's bank is getting low. Every ton of hay sold from the farm the manure from which is not returned to the soil takes off $5 worth of fertilizer, cotton seed about $11, corn $6.75. This has been going on till the farm responds reluctantly to many of our drafts.

The importance of the compost has been shown already, but we would impress very strongly on the minds of the farmers that the better the material that enters into this compost the more value they will obtain from it. There is no better way of increasing the value of the materials than to have all the stable manure it is possible to get. To do this all the stock on the farm must be kept under sheds and in stables when feasible, and an abundance of bedding furnished to absorb the liquids as well as add to the bulk of the manure heap.

The materials named in the following table are more or less available on every farm, and it can be seen from the composition of each which are the most desirable.

TABLE I.—*Composition of farm litter and straw and its value as fertilizer.*

| Kind of straw or litter. | Nitrogen. | Phosphoric acid. | Potash. | Value of each ton. |
|---|---|---|---|---|
| | *Per cent.* | *Per cent.* | *Per cent.* | |
| Wheat straw | 9.6 | 4.4 | 16.4 | $3.18 |
| Rye straw | 11.2 | 5.1 | 18.1 | 3.54 |
| Oat straw | 14.4 | 3.6 | 23.0 | 4.35 |
| Barley straw | 11.4 | 5.0 | 23.5 | 3.87 |
| Pea straw | 20.8 | 7.0 | 19.8 | 5.61 |
| Soy-bean straw | 14.0 | 5.0 | 22.0 | 4.31 |
| Buckwheat straw | 13.0 | 7.1 | 24.2 | 4.35 |
| Millet straw | 14.0 | 3.6 | 34.0 | 4.88 |
| Marsh hay | 17.2 | 10.6 | 54.0 | 7.06 |
| Leaves | 15.0 | 3.2 | 6.0 | 4.12 |
| Rice straw | 15.1 | 5.2 | 8.4 | 3.79 |

We trust that we have made the value of farm manures sufficiently evident and that more farmers will give attention to their saving.

S. A. KNAPP,
*Special Agent in Charge.*

Approved:
G. H. POWELL,
*Acting Chief of Bureau.*

MARCH 2, 1910.